

REMARKS

Claims 75-91 are pending in this application. Claims 81 and 91 are amended. Claims 1-74 were previously cancelled as pursued in the parent case. Please consider the following remarks.

Claims 81 and 91 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. This rejection is respectfully traversed and reconsideration is requested.

The Office Action states, at page 2, "Claim 81 is dependent upon claim 76. Claim 76 recites the limitation of 'a single gas serves as said titanium precursor and said nitrogen precursor'. However, claim 81 recites the limitation of the titanium precursor being 'bis(2,4-dimethyl)(1,3-pentadienyl)titanium, titanium tetrachloride, titanium tetrabromide, titanium tetraiodide, and cyclopentadienylcycloheptatrienyltitanium.' Each of these precursors includes no nitrogen. Therefore, it is not possible to use these gasses as the titanium and nitrogen precursor as stated in claim 76." (emphasis in original). Claim 81 has been amended to depend from claim 75, which does not contain the limitation requiring that a single gas serves as a titanium precursor and a nitrogen precursor.

Regarding Claim 91, the Office Action states at page 3, "This limitation does not make sense as written, because, for example, there are no such compounds that consist of $TiNR_2$ wherein R is titanium tetrachloride." This misrepresents the claim. As discussed at page 12 of the specification, R is selected from the group of consisting of H, an alkyl and/or aryl group. The remaining compounds, including titanium tetrachloride, are distinct titanium precursors. Claim 91 has been amended to clarify the language of the claim. Applicant notes that this amendment should not be considered to be a disclaimer of any subject matter.

Claims 75-85 and 88-91 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 6,087,674 to Ovshinsky et al. in view of U.S. Pat. No. 6,235,631 to Russell and U.S. Pat. No. 6,156,630 to Iyer. This rejection is respectfully traversed and reconsideration is requested.

First and foremost, these three references do not constitute prior art. Inventor Westmoreland submitted a declaration in the parent case under 37 C.F.R. § 1.131, swearing that the conception date of the invention predated June 30, 1997. A copy of this declaration and accompanying evidence is attached as Exhibit A. The declaration is directed to the same disclosure and claims contained in the present application.

The subject matter of Ovshinsky relied on by the Office Action has an effective filing date of April 20, 1998. Ovshinsky is a continuation-in-part of U.S. Application No. 098/739,080 to Czubytyj et al. (now U.S. Patent No. 5,825,046), having a filing date of October 28, 1996, but the subject matter relied on by the Office Action, specifically, a "thin film layer includ[ing] one or more elements selected from the group consisting of Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, W and mixtures or alloys thereof in combination with two or more elements selected from the group consisting of B, C, N, O, Al, Si, P, S and mixtures and alloys thereof" (Ovshinsky, Col 9, line 66-Col. 10, line 4), does not appear anywhere in the parent application. Therefore, the effective filing date of the subject matter relied on by the Office Action is April 20, 1998, the actual filing date of the application.

The effective filing date of Russell is October 30, 1997, based on the filing date of Provisional Application No. 60/064,372. The effective filing date of Iyer is August 22, 1997. The conception date of the present invention, as evidenced by Exhibit A, predates all three cited references. Therefore, none of Ovshinsky, Russell, and Iyer constitute

prior art as applied to the present application because none of their effective filing dates predate June 30, 1997.

Even assuming, *arguendo*, that these references do constitute prior art, the cited references do not disclose, teach or suggest the claimed invention.

Regarding independent claim 75, the Office Action, on page 3, states "Ovshinsky discloses depositing a single layer (6,8) containing a first metal (titanium), aluminum, nitrogen and boron on a semiconductor substrate (10) (col. 9, ln 44 - col. 10, ln. 5). Ovshinsky does not disclose what method is used to deposit this layer." The Office Action makes the same statement regarding independent claims 88 and 89 on pages 5 and 6, respectively. However, the Office Action relies on a passage in Ovshinsky that merely provides a list of nine different elements (Ti, V, Cr, Zr, Nb, Mo, Hf, Ta, W) that may be combined with any two or more elements out of a possible seven (B, C, N, O, Al, Si, P, S and mixtures and alloys thereof) to arrive at the "single layer containing a first metal, aluminum, nitrogen and boron on a semiconductor substrate." Indeed, none of the specific examples provided by Ovshinsky (TiCN, TiAlN, TiSiN, W-Al₂O₃ and Cr-Al₂O₂) disclose, suggest or teach "a single layer containing a first metal, aluminum, nitrogen and boron on a semiconductor substrate."

The Office Action states at page 3 "Russell discloses depositing a thin film Ti-Al-N layer on a semiconductor substrate" and "teaches a CVD method of depositing a Ti-Al-N film." However, "[n]either Ovshinsky nor Russell teaches how to incorporate Boron into the Ti-Al-B-N film." As discussed above, neither Ovshinsky nor Russell even discloses a Ti-Al-B-N film. Nor does either reference disclose, teach or suggest any advantages of "depositing a single layer containing a first metal, aluminum, nitrogen and boron on a semiconductor substrate" in the manner described in claims

75, 88 or 89 so as to suggest any additional methodology not specifically disclosed in the references.

The Office Action states, on page 4, "Iyer teaches a method of depositing a titanium boride layer on a semiconductor substrate . . . using a CVD process." However, titanium boride is not the same as the layer provided by the method of the claims. Nowhere does Iyer disclose, teach or suggest "depositing a single layer containing a first metal, aluminum, nitrogen and boron on a semiconductor substrate."

There is clearly no motivation evidenced in the references themselves for selectively combining their teachings in the manner expressed in the Office Action. The rejection relies on improper hindsight in combining the references. Using Applicant's claimed invention as a roadmap, the Office Action improperly pulls together a multitude of prior art references and declares that "it would have been obvious to one of ordinary skill in the art" to have combined these references in a manner described nowhere except in Applicants' claims. A person of ordinary skill in the art would not have been motivated to combine these references; they would not have produced the claimed invention because they address different problems and provide different advantages. Without Applicants' claims and disclosure as a guide, there is no motivation to combine these references in a way that would arrive at Applicants' claimed invention.

Claims 76-85 are dependent on claim 75, and claims 90 and 91 are dependent on claim 89. As noted above, none of Ovshinsky, Russell or Iyer constitute prior art. Further, none of Ovshinsky, Russell or Iyer, whether taken alone or separately, disclose, teach or suggest the processes of independent claims 75, 88 and 89, and hence of claims 76-87, 90 and 91. All claims are patentable over these references and it is respectfully

requested that the 35 U.S.C. § 103(a) rejection of claims 75-85 and 88-91 therefore be withdrawn.

Claims 86 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ovshinsky in view of Russell and Iyer and further in view of U.S. Pat. No. 6,313,035 to Sandhu et al. This rejection is respectfully traversed and reconsideration is requested.

As noted above, the three primary references relied on by the Office Action do not constitute prior art. Sandhu does not provide the missing disclosure sufficient to render claim 86, or any of its underlying claims, obvious.

Assuming, *arguendo*, that the underlying references all constitute prior art, none of Ovshinsky, Russell, Iyer and Sandhu, alone or in combination, disclose, teach or suggest all the limitations of the claimed invention.

Page 7 of the Office Action states "Ovshinsky, Russell and Iyer do not disclose the structure of the CVD apparatus used to deposit the Ti-Al-N layer. Sandhu discloses using a CVD process to deposit a titanium-containing layer from a TDMAT precursor." However, nowhere does Sandhu disclose, teach or suggest "depositing a single layer containing a first metal, aluminum, nitrogen and boron on a semiconductor substrate" as required by claim 75, on which claim 86 depends.

Therefore, none of Ovshinsky, Russell, Iyer or Sandhu, whether taken alone or separately, disclose, teach or suggest the processes of independent claim 75, and hence of claims 86. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claim 86 be withdrawn.

Claims 87 stands rejected under 35 U.S.C. § 103 as being unpatentable over Ovshinsky in view of Russell and Iyer and further in view of Murzin et al. (U.S. Pat.

No. 6,117,772) ("Murzin"). This rejection is respectfully traversed and reconsideration is requested.

As noted above, the three primary references relied on by the Office Action do not constitute prior art. Murzin also has an effective filing date, July 10, 1998, falling after the conception date of the present invention, as evidenced by Exhibit A.

Assuming, *arguendo*, that the underlying references all constitute prior art, none of Ovshinsky, Russell, Iyer and Murzin, alone or in combination, disclose, teach or suggest all the limitations of the claimed invention.

Page 8 of the Office Action states "Ovshinsky, Russell and Iyer do not disclose the structure of the CVD apparatus used to deposit the Ti-Al-N layer. Murzin discloses using a CVD process to deposit a aluminum-containing layer from a DMAH precursor." However, nowhere does Murzin disclose, teach or suggest "depositing a single layer containing a first metal, aluminum, nitrogen and boron on a semiconductor substrate" as required by claim 75, on which claim 87 depends.

Therefore, none of Ovshinsky, Russell, Iyer or Murzin, whether taken alone or separately, disclose, teach or suggest the processes of independent claim 75, and hence of claims 87. Applicant respectfully requests that the 35 U.S.C. § 103(a) rejection of claim 87 be withdrawn.

In view of the above amendment and remarks, applicant believes the pending application is in condition for allowance. A Notice of Allowance for all pending claims is respectfully requested.

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Respectfully submitted,

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Attachments: Exhibit A.